North Highlands Hydroelectric Power Development, 1900 HAER GA-26
38th Street on the Chattahoochee River
Bibb City (Columbus)
Muscogee County
Georgia

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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HISTORIC AMERICAN ENGINEERING RECORD

Hydroelectric Power Development at North Highlands

HAER GA-26

Location:	38th Street on the Chattahoochee River at the Bibb Company plant, Bibb City, Georgia (just north of Columbus).
Date of construction:	Dam: 1902 Existing power house: 1963
Original owner:	Columbus Power Company
Present owner:	Georgia Power Company
Present use:	Generating Capacity 30,000 KW.
Significance:	This development was the largest in the South when built in 1900. Originally, the dam provided water for 2 power houses: one for hydroelectric power generation, one for hydromechanical power transmitted to the Bibb Mill, situated on the bluff above the dam. The simultaneous use of electrical and mechanical transmission reflects the period's view of electric power simply as a substitute for mechanical transmission when transmitting over distances. These early electricity users did not employ motors to directly power their machinery; their motors turned line shafting inside the mills. The rope drive that transmitted power to the Bibb mill until 1954 is both a curiosity and a tribute to the efficiency of mechanical power transmission. The original power houses produced electricity for Columbus until 1963 when they were replaced by a modern 30,000 Kilowatt hydroelectric plant.
Historians:	J. B. Karfunkle, John S. Lupold and Barbara A. Kimmelman, August 1977

Hydroelectric Power Development at North Highlands

Dam and Power House Construction

An early description of the shoals at North Highlands shows that the fall at what was then known as Lover's Leap was an attractive site for a water power development. "At the leap the river makes a sudden turn and forms an angle with its course below, flowing in a narrow channel so regularly lined with rocks on both sides and of such uniform width as to resemble a canal." The popular name, Lover's Leap, derives from a story involving the native Indians of the area. [1]

In 1894 G. Gunby Jordan of the Eagle Phenix Mills, prompted by Mr. John Hill, his chief engineer at the mill, undertook to "corral the properites out of which grew the North Highlands Dam." He first acquired the Rock Island paper mill property located at the falls. After obtaining the properties and the necessary riparian rights, Jordan associated with Major John F. Hanson and E. T. Comer of the Bibb Manufacturing Company, and H. T. Comer of the Central of Georgia Railroad to organize the 1897. At this time these "amateurs" began development of Lover's Leap Falls. [2]

In conjunction with the Columbus Power Company development, the Bibb Company directors authorized the construction of a 20,000 spindle cotton mill to be built on the bluff overlooking the falls. These two projects were thus undertaken by 2 separate corporations directed by the same interests. In March, 1900. while construction was still in progress the Bibb Company acquired, by the exchange of Bibb corporate stock, 2,997 of 3,000 total shares of Columbus Power Company common stock. At this time Bibb directors amended the plans for thier mill, expanding it to a 25,000 spindle operation. [3]

Two separate power houses were constructed in accordance with the designs of Mr. Whitner of South Carolina, under the direction of William S. Lee, who later became president of the Southern Power Company. Power house #1, at the dam, was operated by the Columbus Power Company; #2, located 100 feet below the dam, was Bibb Manufacturing Company property [4] Power house #1 was to provide electrical power for sale and distribution to large power users (50 horsepower or more). Power house #2 was built to power the American rope drive system which turned the shafting of the Bibb mill.

The dam and power houses were in operation by 1901 (see Bibb photo 1). B. H. Hardaway, who later built the Tallulah Falls power dam in northern Georgia, was the contractor. Electricity generated by 3 1,080-Kilowatt generators was supplied to F. B. Gordon's newly constructed mill, the olumbus Manufacturing Company, the "first mill . . . in Columbus to be operated exclusively by hydroelectric power." Gordon built his mill with the understanding that it would take power from the hydroelectric development. The Bibb mill, powered mechanically from power house #2, also commenced operations in 1901 [5] (see WPD photo 9).

A "freshet" (flood) on 29-30 December 1901 broke the dam and ten feet two inches of water flowed over the spillway. Two huge gaps formed in the structure. The same day there were at least 5 other dam failures in the South, 3 of which were dams designed by engineer Whitner (at Tallasee, Alabama and Anderson, South Carolina, in addition to Columbus). The gaps widened as the rubble masonry of the dam loosened and tubled downstream. When the water receded the western gap measured 200 feet; the gap on the Georgia side was 150 feel long. [6]

Rebuilding proceeded slowly. The Columbus Manufacturing Company considered trying to operate their motors off their steam plant when it was clear. The Bibb and the Columbus Manufacturing Company operations would be crippled for an extended period. The EAgle and Phenix mills ran their Mill #2 at night in order to give the Bibb operatives temporary employment. Plans were drawn up to botain power from the City Mills power station of the Columbus Railroad Company for the Columbus Manufacturing Company; but during the high water prevailing in early 1902, when the rising waters of the Chattahoochee severely hindered effective flow through the turbines, the Railroad could not furnish sufficient power to operate its own motors, lighting, and power circuits. Full scale operations of the North Highlands power houses did not resume until 24 April 1902. [7] Even then the new dam was not completed.

This dam extended 3 1/2 feet above the masonry of the old dam, increasing the area of the pond behind the dam. The Columbus Power Company purchased the land and riparian rights for the added pon area from the Chattahoochee Falls Company for $7,000.00. [8] The dam, 18 feet thick at the base and 20 feet thick 10 feet from the crest, was built of concrete masonry with a cut stone spillway surface. The length was 975 feet 8 inches and the east-west rollway was 727 feet 8 inches long (WPD photo 7). This dam still serves the hydroelectric facilities at the site today.

Provisions were made for operating the flood gates in the dam by means of oil pressure. A large, heavy cylinder and piston, attached to the dam above each gate, lifted and lowered the flood gate by hydraulic pressure. A Stillwell-Bierce 1 x 16 inch triplex pump, belted to one of the exciter units in power house #1, maintained the oil pressure at 750 pounds/square inch. [9]

The new dam provided an average of 41 feet of effective head. The average flow was about 5500* cubic feet/second of water and the minimum flow was about 1000 cubic feet/second. This gave an average of 25,600 horsepower available and a minimum 4,600 horsepower available in low flow periods. [10] **

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*Based on average flows at West Point (30 miles north of Columbus recorded by B. M. Hall, hydrographer in 1896. At West Point, average flow was 4,650 cubic feet/second. 18% was added to account for water from tributaries between West Point and Columbus.

**Power in h.p. = $\frac{qh}{8.8}$ q = flow in cubic feet/second
h = head in feet

Power station #1 had a rated 6,000 electrical horsepower capacity in 1903; the Bibb power station was designed to develop about 3,000 horsepower. 1,500 horsepower was applied to the rope drive; the rest was used for electric lighting and other electric applications. [11]

Electrical Equipment

Power house #1, used by the Columbus Power Company to generate electricity for power and lighting, was 137 feet long, 52 feet wide, and stood at the eastern end of the dam so that the "forbay [was] impounded by the dam and powerhouse structure and no penstocks were necessary." The heavy stone masonry bulkhead which was part of the station foundation was pierced by 6 openings for the 6 units which were to be the ultimate developments. The first 3 pairs of wheels and 3 generators were in place by 1901. Columbus Power Company installed 2 more of these units in November of 1904. [12]

The horizontal turbines sat in short flumes (chambers) behind the openings in the bulkhead wall. A heavy cast iron plate closed the south end of each wheel chamber. The wheel shaft of each pair of turbines went through this plate into the power house proper. A horizontal alternator connected directly to the wheel shaft in the manner standard for this sort of development [13] (CPC photo 1).

The head gates of wood planking were manually lifted by means of rack and pinion. The wheel pits were 21 feet deep and had concrete bottoms and stone walls. The roofs of the wheel chambers were arched with a 6 foot radius of curvature. The water wheels were pairs of 39-inch Hercules turbines built by the Holyoke Machine Company. They sat horizontally in the flume 15 feet below the normal head water level, 25 feet above the normal fall water level. Each pair of wheels discharged into a draft tube 7 1/2 feet in diameter at the turbine casing, widening to 10 feet in diameter at the discharge end. Each of the 6 discharge chambers was 16 feet wide with a brick arched roof supported by piers 4 feet thich (photo CPC 2). Two exciters, directly connected to an 18-inch Hercules wheel set at the western end of the station, provided field current for all 5 alternator/generators. [14]

These 5 generators were rated to produce 1080 Kilowatt, 6000-volt, 60 cycle current at 200 r.p.m. At this speed the pair of Hercules turbines developed 1,484 horsepower. Leather star-shaped couplings connected these generators to their wheel shafts. The d.c. exciters were of the "Eddy" type, rated for 60 Kilowatt capacity at 75 volts when driven at 450 r.p.m. Because the load on the line in the 1901-1911 period was primarily made up of synchronous motors (not inductive motors) the power factor was close to 1.00. Thus, the current required for field excitation was minimal. In 1903-1904 power used for field excitation amounted to only 1% of the total power generated at the station. [15] The usual requirement is more on the order of 4% for lagging loads which have a power factor less than 1. The 5 main generators were reported to have an efficiency of 96.4-96.5%; the temperature rise of the coils had never risen to more than 15° F above that of the room (99° F) when load factor was .88. [16]

A Schenk Governor (made by the Schenk Governor Co., Meriden, Conn.) compensated for variations in the load by moving the wicket gates of the turbines. The speed at which the turbines operated was important; any variation produced changes in the generators' rotation, causing fluctuation in the number of cycles per second of the transmitted current. Avoiding this was critical because the synchronous motors on the line were very sensitive to changes in current frequency. A "Queen" recording tachometer was attached to the governed pairs of turbines to monitor the speed of rotations of the wheel shaft. [17]

To handle the load of 1903 the two generators then installed were started a little before 6 a.m. At 6 a.m. the mills began operation. One generator was shut down at 5:30 p.m., the other at 11 p.m. During lunch hour 1/2-2/3 of the load was dropped. After 5:30 p.m. the load fell to 1/6, being largely a demand for lighting [18] (see Appendix 1).

Power house #2 was originally intended to develop power for the Bibb Mill, to be transmitted primarily by rope drive. This station stood about 100 feet downstream from the forebay of the dam. Water for its turbines entered an opening on the eastern end of the bulkhead of the dam, and flowed through a steel penstock 15 feet in diameter which ran beneath power house #1 (photo CPC 3). This feeder then divided into 2 branches, each feeding a pair of turbines. The larger of the two branches also served a single turbine through a flume 5 feet in diameter. Tail water was discharged into the river beneath the house where the river bed had been excavated to give 15 feet of water depth. Tail water from both power houses flowed into a race separated from the main stream by a wing wall built of rock blasted out for the tail race (see Bibb site plan, Columbus Drawing 3, insert; also photo WPD 9).

The 2 pairs of larger wheels in power house #2 were 36-inch Hercules turbines set in the horizontal position. Each pair of turbines directly drove a horizontal shaft at 225 r.p.m. At this speed the pair of turbines could develop about 1,500 horsepower. The eastern pair of wheels turned the American rope drive which transmitted power to the Bibb mill. [19]

The western pair of wheels, installed in 1906, drove a generator which fed into the Columbus Power Company circuits. The single turbine, located just south of the eastern pair of turbines, capable of developing 225 horsepower, turned a shaft at 225 r.p.m. A 150 Kilowatt Stanley Lighting dynamo, giving 3 phase a.c. current of 250 volts and 75 cycle per second at 1000 r.p.m., was belted to that shaft. A Northern Electric Dynamo of 200 Kilowatt, 120 volt capacity (d.c.) belted to the generator provided current for field excitation. The single turbine also turned a Holyoke rotary duplex fire pump, a centrifugal pump, and a triplex pump for the water system of the mill and for Bibb City. [20]

A switchboard in power house #2 controlled lights in the Bibb mill. There were 5 feeders for mill lighting, 1 for arc street lighting, and 1 for incandescent lights in houses in the mill village. In 1904 there were 500 incandescent and 16 arc lights operating on these lines.

A large centrifugal pump drew water from the wheel case of the eastern turbines; the "Deane" triplex pump lifted the water to a filter and settling tank on the bluff near the mill. Filtered water was sent to the mill and to the mill village. Residents of Bibb City, all mill operatives, received lighting and water free of charge. [21]

The American rope drive was designed and installed by the Dodge Manufacturing Company. The shaft from the eastern turbine pair turned the driving sheaves in the power house. A wooden case with a window enclosed the sheaves. The receiving sheaves at the mill were 60 feet higher in elevation than the driving sheaves. From center to center the sheaves were 116 feet apart. 7000 feet of 1 1/2 inch manilla rope wrapped 30 times around the sheaves. A sheet iron covering protected the transmission line from power house to mill. The receiving sheaves turned an 8 1/2-inch forged steel shaft at 300 r.p.m. The shaft extended across the 4-story machine shop to the rope tower at the west end of the mill proper where it turned driving sheaves at the base of the mill. Ropes ran from these to receiving sheaves on each floor in the rope tower. These driving sheaves were mounted on quills so that floors could be disengaged while others continued to run (see Bibb photos 16, 18, 19, 20, 22).

A schenk governor controlled the speed of the entire rope system at the turbines. The rope drive was capable of transmitting 1,500 horsepower. [22] The American system was universally employed for short distance mechanical power transmission and was particularly suited to vertical distribution. Efficiency was about 85% [23] (see Bibb Company Report for more detailed explanation of rope drive).

Later History

The Bibb Company sold the North Highlands dam site back to the Columbus Power Company and relinquished control of the company on 20 March 1906. The agreement included favorable power and water guarantees for Bibb. Bibb retained the 2 easternmost head gates and the apparatus for the rope drive. The undeveloped portion of the #2 power house was transferred to the Power

Company under the condition that Bibb was guaranteed another 1000 electric horsepower of primary power when it was required. [24] At this time the Columbus Power Company, the Chattahoochee Falls Company and the Coweta Power Company merged to form the Columbus Power Company. George J. Baldwin of Savannah, who controlled the Columbus Railroad Company, now tood control of the Columbus Power Company; Stone and Webster, the general managers of the Columbus Railroad Company, became general managers of the Columbus Power Company. [25] (see Water Power Development at the Falls of the Chattahoochee, H.A.E.R. report, 1977, for detailed discussion of the Power Company's history under Baldwin's direction)

Soon thereafter, arrangements were made for the Columbus Power Company to lease the City Mills generating station of the Columbys Railroad Company. From then on the Columbys Power Company held full control of the entire commercial electric light and power business in Columbus, and owned riparian rights extending about 11 miles upriver toward West Point (30 miles north of Columbus). [26]

The Stone and Webster syndicate provided technical and administrative services to the companies it held. Their engineers, having previously inspected the North Highlands power development, reported to Baldwin that the existing 39-inch turbines were improperly selected for the head and flow available. They found that a maximum of 4300 Kilowatts was available at the switchboard in power house #1 while 5400 Kilowatts was the actual rated capacity of the 5 generators. The generators thus had an electrical power capacity greater than the power capacity of the turbines to compensate for low power factor loads. It was shown that the hydroelectric development was operating at less than 80% efficiency only four years after the installation was complete. In order to correct the situation, 42-inch turbines replaced the 39-inch wheels. [27]

Annual periods of low water in the river crippled all hydropower development on the Chattahoochee until 1910, when the Goat Rock dam was built upstream. In low flow stages Peak hour demands from North Highlands dam and the City Mills station could not generate sufficient power for all Power Company customers and the electric railroad. To help alleviate the situation, Bibb usually shut down its mill operation so that water running to power house #2 could instead run power house #1. [28]

The power company built a 1,500 Kilowatt steam station at 2nd Avenue and 19th street in 1907 (most hydroelectric developments of the day maintained auxiliary steam plants to cover for low and high water stages). Even with this added capacity independent of the river flow, power from the Company was not adequately reliable or available. In 1910 a 1,500 Kilowatt 11,000 volt Westinghouse alternator was installed in power house #1 to provide additional capacity. [29]

In 1910 the Company began the construction of an impounding dam at Goat Rock, 13 miles north of Columbus. This dam was to store enough water to maintain a constant flow of water at North Highland. Power production commenced at Goat Rock in 1913. [30] Soon after the North Highlands site ceased to be the major source of hydroelectric power at the falls of the Chattahoochee. By 1927 the North Highlands power house developed 6900 Kilowatts, Goat Rock produced 16,000 Kilowatts and the Company's newly constructed Bartlett's Ferry dam produced 30,000 Kilowatts. [31]

In 1954 the 8 1/2 inch steel shaft in the Bibb machine shop snapped, completely crippling power transmission from the rope drive in power house #2 to the sheaves in the rope tower. Bibb discontinued use of the rope system fully electrified that portion of the main mill served by line shafting. Electrical production for the Georgia Power Company continued at power house #1 and in #2 house until 1960. [32]

The Georgia Power Company destroyed both power houses and built the existing single station, which went into operation in 1963 (photo CPC 4). The dam was not altered. The modern generating equipment, 3 Allis Chalmers vertical units, can produce up to 30,000 Kilowatts. [33]

Conclusion

The original power house #1 was an archetype for medium head development of the early 20th century. Placement of generators in a row behind pairs of horizontal turbines was a typical arrangement. This power house was used as an example of good hydroelectric practice in two texts on hydroelectric practice. The station, provided with many large windows, with the switchboard gallery on an elevated platform in an alcove on the south side (see CPC photo 5), was considered quite well designed. [34]

The concomitant development of mechanical and electrical transmission systems at one site is evidence of the state of the art of electric power utilization at the turn of the century. Electricity was considered an efficient form of long distance power transmission. In this instance, the first major subscriber for power from power house #1 was the Columbus Manufacturing Company, standing 1500 feet from the dam. Electricity from the station powered two large G. E. 600 horsepower synchronous motors at the mill which, in turn, drove the sheaves of a European rope drive system. The rope drive turned the line shafting of the mill. [35] The Bibb mill was close enough to the dam that water power could be effectively used to directly turn the rope drive. In both mills, all machinery was powered mechanically be belts and pulleys driven by the rope mechanism. Application of electricity to individual motors on each piece of equipment was an advance still in the developmental stage in 1900. [36]

The use of electricity to transmit power over distances was in itself a major advance. The Columbus Power Company was able to expand its market and influence to cities and industries previously beyond its reach by construction of long-distance transmission lines (see Water Power Development at the Falls of the Chattahoochee, H.A.E.R. report, 1977, for further details). As this expansion continued, the North Highlands dam and power station, once considered a major Southern development, became a small part of a regional power system.

Footnotes

1. Industrial Index, 22 (18 April 1928), Columbus Centennial Number 8, p. 97; the legend of Lover's Leap follows:
   The aged chief of the Cussets tribe betrothed his favorite duaghter, Mohina, to the young chief of the Coweta tribe. Soon the tribes became enemies and Mohina was forbidden to remain with her husband.

   They met secretly in the dense forests around the Chattahoochee. A young Cusseta warrior desiring the hand of the beautiful Mohina followed the girl as she went to meet the Coweta chief.

   The jealous Cusseta warrior returned to his old chief and reported that he had spotted an enemy Coweta warrior spying on the tribe. In return for the cpature of this enemy, he was to receive Mohin as a reward. The warrior collected a party of Cusseta and they ambushed the lovers.

   The Coweta chief pressed Mohina to his heart when the hunter sprang forth with a yell. Mohina and he fled, and for a while outdistanced the Cusseta. But Mohina soon tired. The Coweta Eagle snatched the girl and ran on to the banks of the Chattahoochee. With the Cusseta band close behind he ran into the fearful length of rocks above the rushing river. As the jealous tribesman of Mohina lunged at the couple with his tomahawk, the Coweta Eagle sprang into the seething waters below, Mohina still clinging to him. The Cusseta warrior lost his balance and also fell into the rocks in the river. The horror stricken warriors gazed into the foaming torrent then rushed back to their chief with the sad news. The Old Cussetta chief died, his heart broken.

2. Quote of G. Gunby Jordon in Etta Balnchard Worsley, Columbus on the Chattahoochee, Columbus Ga., 1951, p. 395; interview with William H. Martin (descendant of John Hill) conducted by John S. Lupold 23 August 1977. All quotations in paragraph are from Jordan.

3. Henry Pittman, "The Bibb Manufacturing Company: A Profile of Progress, People and Plants," unpublished typescript circd. 1955, Bibb Company Records (BCR), Macon, Georgia.

4. G. Gunby Jordon quoted in Worsley, p. 395.

5. Pittman typescript, BCR.

6. B. H. Hardaway, "Failure of Dams Near Anderson and Columbus," Columbus Enquirer-Sun, 4 January 1902 (see also the B. H. Hardaway "Remarks on Recent Failures of Masonry Dams in the South," Engineering News 47 (6 January 1902) 101-109, for more on the dam failures); George J. Baldwin to Major J. F. Hanson, 10 January 1902, George J. Baldwin Papers, Southern Historical Collection, University of North Carolina at Chapel Hill. Baldwin served as President of the Columbus Power Company 1906-1923.

   All notes to Baldwin in this paper refer to the Columbus letters.

7. Columbus Enquirer-Sun, 5 January 1902, 9 January 1902, 28 January 1902.

8. J. F. Hanson to Baldwin, 13 May 1902, memo 15 April 1902, Baldwin Papers, SHC, UNC.

9. "Plant of the Columbys Power Company, Columbus, Georgia," Electrical World and Engineer (E.W. and E.) 43 (23 January 1904), 165-168; see also "Plant of the Columbus Power Company, Columbus, Georgia," Engineering Record (16 January 1904), 64.

10. Baldwin correspondence, April-May 1902, Baldwin Papers. SHC, UNC; "Plant of the Columbys Power Company . . .," E. W. and E., 23 January 1904.

11. Baldwin correspondence, 1902, Baldwin Papers, SHC, UNC.

12. "Plant of the Columbus Power Company . . .," E. W. and E., 23 January 1904; J. F. Hanson to G. J. Baldwin, 26 November 1904, Baldwin Papers, SHC, UNC.

13. "Plant of the Columbus Power Company . . . ," E. W. and E., 23 January 1904; Alton D. Adams, Electric Transmission of Water Power, New York, 1906, 83.

14. "Plant of the Columbus Power Company . . ." E. W. and E. 23 January 1904.

15. lbid.

16. Correspondence between H. S. Reynolds (manager, Columbus Railroad Company) and G. J. Baldwin, 2 February 1903, Baldwin Papers, SHC, UNC.

17. "Plant of the Columbus Power Company . . . ," E. W. and E., 23 January 1904.

18. Ibid.

19. Ibid; see also Manufacturers Record 7 April 1906, p. 61.

20. "Plant of the Columbus Power Company," E. W. and E., 23 January 1904.

21. Ibid.

22. lbid.

23. William Staniec, Mechanical Power Transmission, McGraw Hill (May 1928, 1st Edition), 263; Records of the Engineering Department, BCR, Macon, Georgia.

24. Correspondence between J. F. Hanson and G. J. Baldwin, March 1906, Baldwin Papers, SHC, UNC.

25. Baldwin letters, March 1906, and Baldwin to Stone and Webster, 25 May 1907.

26. Baldwin Correspondence, 1906-1907, Baldwin Papers, SHC, UNC, see records of the Columbus Electric Company for June, 1905, at Georgia Power Company offices, Atlanta, Georgia, for information on the Power Company's holdings.

27. Manager Wallace (Stone and Webster) to Baldwin, 2 November 1904; Summary of Power in Columbus, Engineering report to Stone and Webster, 19 December 1904, memo from Stone and Webster, 5 March 1904, Baldwin Papers, SHC, UNC; Directors Report, Columbus Electric Company, 16 December 1910 at Georgia Power Company offices, Atlanta, Georgia.

28. The chronic dificulties with water regulation experienced by hydropower users at Columbus is well underscored by Bladwin's Columbus letters, 1900-1910. For fuller account of these problems, see Water Power Development at the Falls of the Chattahoochee, H.A.E.R. report 1977.

29. Note to Baldwin, 3 May 1907, Baldwin Papers, SHC, UNC; Directors Report, Columbus Electric Company, 16 December 1910, at Georgia Power Company offices, Atlanta, Georgia.

30. Manufacturers Record (April 7, 1910) D. H. Braymer, "The Generating System of the Columbus Power Company, Columbus, Georgia," Electrical Engineering (formerly Southern Electrician) (June 1913), 247-254.

31. E. W. 89 (22 January 1927), 196.

32. Records of the Engineering Department, BCR, Macon, Georgia.

33. Phone interview with two engineers of the Georgia Power Company, conducted by J. B. Karfunkle, 4 August 1977.

34. Adams, Electric Transmission . . ., 83; the two texts were Adams, above, and Daniel W. Meade, Water Power Engineering, N.Y., 1920 (see pp. 565-567).

35. "Plant of the Columbus Power Company . . .," Engineering Record 16 January 1904.

36. Pittman typescript, BCR. Bibb first used electricity to drive groups of machines in 1916, when an addition to the original mill was built. The rope drive continued to power equipment in the original section until 1954. See Bibb Company report, H.A.E.R. 1977.

Bibliography

Manuscript sources

George J. Baldwin Papers, Southern Historical Collection, University of North Carolina at Chapel Hill. Baldwin, of Savannah, Georgia, was active in hydroelectric development in Columbus from 1901-1920's. He was president of the Columbus Power Gompany from 1906-1923. His correspondence with Columbus associates clearly describes hydroelectric activities in Columbus.

Columbus Power Company Records held on file at the offices of the Georgia Power Company in Atlanta, Georgia. These contain minutes of meetings of the Boards of Directors which pertain mostly to financial aspects of the company; details of expenditures for equipment and expansion are given.

Pittman, Henry a manuscript history of the Bibb Manufacturing Company held in Bibb Gompany files Macon, Georgia. Outlines developments in Bibb which led to the organization of the Columbus Power Company. Relations between the companies is discussed.

Printed Sources

"Plant of the Golumbus Power Company, Golumbus Georgia," Electrical World and Engineer 43 (23 January 1904), 156-168. (an almost identical article appeared in the Engineering Record (16 January 1904).

Appendix I: Customers of the Columbus Power Company, 1903. Figures from a letter from H. H. Hunt to Stone and Webster (copy in Baldwin Papers, Southern Historical Collection, University of North Carolina at Chapel Hill.

In 1903, the power customers of the Columbus Power Company were:

	Electrical H.P. used
The Swift Mill	500 H.P.
Hamburger Mill	250 H.P.
Electric Light for Hamburger Mills	100 H.P.
Columbus Manufacturing Co.	1200 H.P.
Columbus Railroad Co.	200 H.P.
Woodruff	500 H.P.
Muscogee Manufactory Co.	400 H.P.

In May, 1904 Columbus Power Company sold primary power to:

Hamburger Mills	300 H.P.
Swift Mill	600 H.P.
Muscogee Manufacturing Co.	300 H.P.
Columbus Manufacturing Co.	1100 H.P.

Secondary power to:

Columbus Railroad Co.	200 H.P.
Georgia Manufacturing Co.	200 H.P.
Muscogee Manufacturing Co.	300 H.P.

Charges for primary power were:

Day time $18-15/hp/year depending on quantity
Night time $12-10/hp/year

Charges for secondary power were 20% less (secondary power is "run-of-river" power - it is not guaranteed during low water or at peak consumption as is primary power). Charges for inductive loads were 20% higher (an inductive load is one made up of induction motors). These loads can "lag" behind the generator; a generator with an inductive load cannot produce its rate power factor is reduced below the rated power factor because of a lagging load.